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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.                   | CONFIRMATION NO.            |
|---|-------------|----------------------|---------------------------------------|-----------------------------|
| 10/710,522  | 07/18/2004  | Chung-Chih Chen      | NAUP0598USA                           | 4521                        |
| 27765   | 7590        | 03/31/2008           |                                       |                             |
| NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION<br>P.O. BOX 506<br>MERRIFIELD, VA 22116 |             |                      | EXAMINER<br>TADAYYON ESLAMI, TABASSOM |                             |
|   |             |                      | ART UNIT<br>1792                      | PAPER NUMBER                |
|   |             |                      | NOTIFICATION DATE<br>03/31/2008       | DELIVERY MODE<br>ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

winstonhsu.uspto@gmail.com  
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mis.ap.uspto@naipo.com.tw

|                              |  |   |  |
|------------------------------|--|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/710,522           | <b>Applicant(s)</b><br>CHEN, CHUNG-CHIH |  |
|                              | <b>Examiner</b><br>TABASSOM TADAYYON<br>ESLAMI | <b>Art Unit</b><br>1792                 |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>01/31/2008</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/11/2008 has been entered.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bryan Chaeyoo Chung et al (U. S. Patent: 6361614, here after Chung), further in view of A. Beverina et al, Electrochemical and Solid-State Letters, Vol. 3(2000)156-158, and Chih-Ning Wu, ( U. S. Patent: 7172976, here after Wu).

Claim 1 is rejected. Chung teaches,

A post etch wet cleaning process [abstract lines 1-5, column 1 lines 24-31],  
comprising;

Providing a wet cleaning tool [fig. 1, column 3 lines 29-32], preparing a wafer having a main surface [column 3 lines 36-41], transferring the wafer into the wet cleaning tool in a light inhibited manner [column 3 lines 39-59]( such as from the entering to the chamber gives at least partial shadowing; that is light blocking); and cleaning said main surface of said wafer by contacting a cleaning solution in said light inhibited manner[ column 2 lines 36-40]. Chung does not teach the detail of the wafer structure such as the wafer has at least one copper wire line, and a dielectric film. Beverina teaches a wet cleaning process [abstract line 1], comprising; preparing a wafer having a main surface comprising at least one copper wire line and a dielectric film [fig. 1, page 156, column 1 lines 1-10]. Beverina teaches at least one opening formed in the dielectric film , where in at least a portion of the copper wire line is exposed through the opening [ fig. 1 and fig. 2]. Beverina further teaches eliminating the light for eliminating the corrosion [abstract lines 3-5]. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of wet cleaning that Chung teaches on the wafer structure that Beverina teaches, because Beverina teaches eliminating the light during the cleaning step, eliminate the corrosion. Neither of them specifically teaches the dielectric film formed on the copper layer. Wu teaches a wet cleaning process for post etch CU-dual damascene structure [abstract lines 1-2], where the structure has copper wires in dielectric film and dielectric film formed on the copper layer (22 and 24) [fig. 1], Wu also teaches at least one opening formed in the dielectric film, wherein at least a portion of the copper wire line is exposed through the opening [fig. 1]. Therefore it would have been obvious to one of ordinary

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skill in the art at the time of invention was made to have a method of wet cleaning that Chung and Beverina teach on the wafer structure that Wu teaches, because the wafer structure that Wu teaches is desirable to treat such structures with a wet cleaning process.

Claim 2 is rejected. Chung, Beverina and Wu teach the limitation of claim 1 as discussed above and Chung further teaches the wafer is a semiconductor [column 3 line 11].

Claim 3 is rejected. Chung, Beverina and Wu teach the limitation of claim 1 as discussed above and Wu further teaches the exposed copper feature is damascened into said dielectric film [ abstract lines 1-2]. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of wet cleaning that Chung teaches where the copper feature is damascened into said dielectric film as Wu teaches, because Wu teaches it is appropriate to apply the wet cleaning process to this structure.

Claim 4 is rejected. Chung, Beverina and Wu teach the limitation of claim 1 as discussed above, and Chung teaches the wafer is not exposed to the light during said cleaning step [column 3 lines 13-16].

Claim 5 is rejected. Chung, Beverina and Wu teach the limitation of claim 1 as discussed above, and Chung teaches the tool comprises a succession of sinks containing said cleaning solution [column 1 lines 41-45].

Claim 6 is rejected. Chung, Beverina and Wu teach the limitation of claim 1 as discussed above, and Chung teaches the said wet cleaning tool is a single-wafer cleaning tool [claim 5].

### ***Response to Arguments***

3. Applicant's arguments filed 01/29/2008 have been fully considered but they are not persuasive.

The applicant argues that the references do not teach the damascene features required by the amendments to the claims. The examiner disagree because, although Chung does not teach the detailed of the wafer structure, but Beverina [fig. 1, abstract lines 1-2, column 1 lines 7-11] and newly-cited Wu [fig. 1, abstract lines 1-2] clearly teach the damascene structure and also exposing the copper feature from the opening.

The applicant argues the cleaning process taught by the references is not a post etch cleaning process, however the wet cleaning is clearly done after the patterning is done (Beverina) or after the damascene is formed in the wafer (Wu).

The applicant argues Chung teaches eliminating the light during rinsing and drying process and not during the cleaning, however Chung clearly teaches eliminating the light during the cleaning [column 3 lines 46-50].

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TABASSOM TADAYYON ESLAMI whose telephone number is (571)270-1885. The examiner can normally be reached on 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tabassom T. Tadayyon-Eslami  
Examiner  
Art Unit 1792

T.T

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1792